

# ***EAST PENN manufacturing co., inc.***

**GRID-SCALE ENERGY STORAGE DEMONSTRATION FOR  
ANCILLARY SERVICES USING THE ULTRABATTERY™ TECHNOLOGY**

**Jeff Seasholtz**

East Penn Manufacturing

**John Wood**

Ecoul



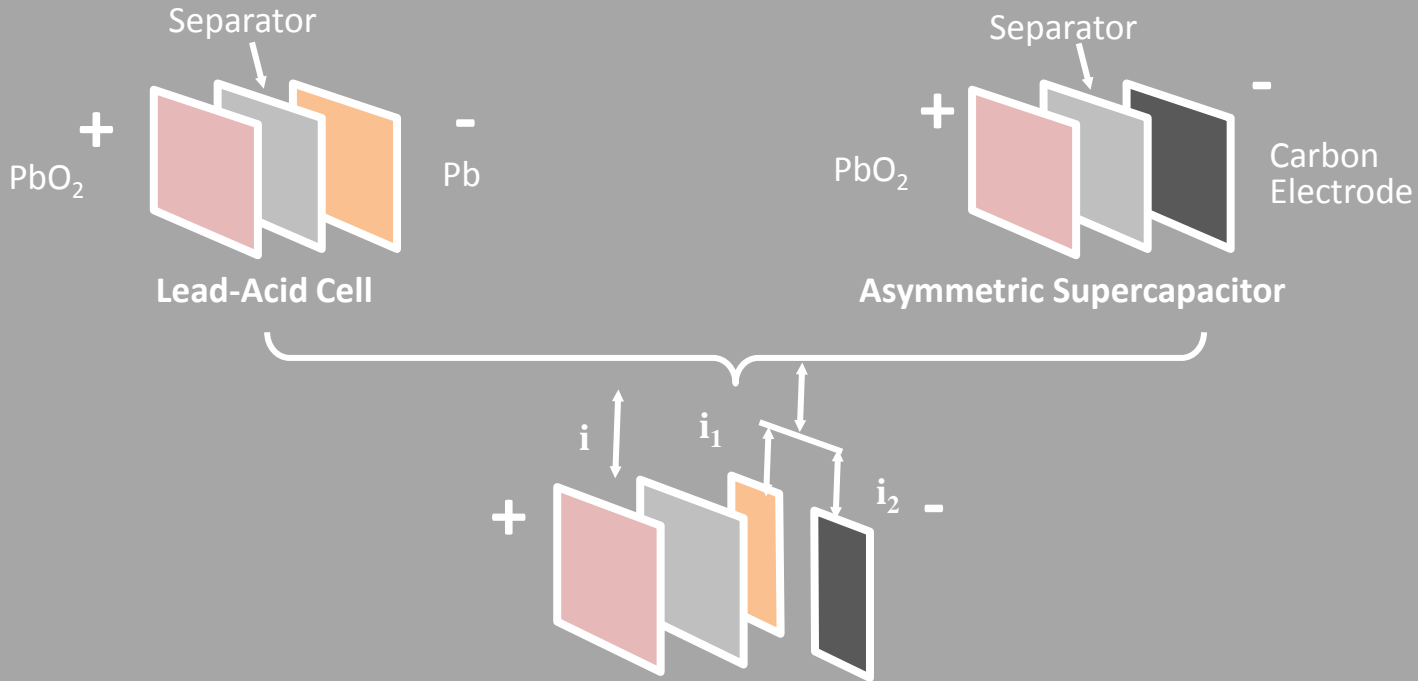
***EAST PENN manufacturing co., inc.***



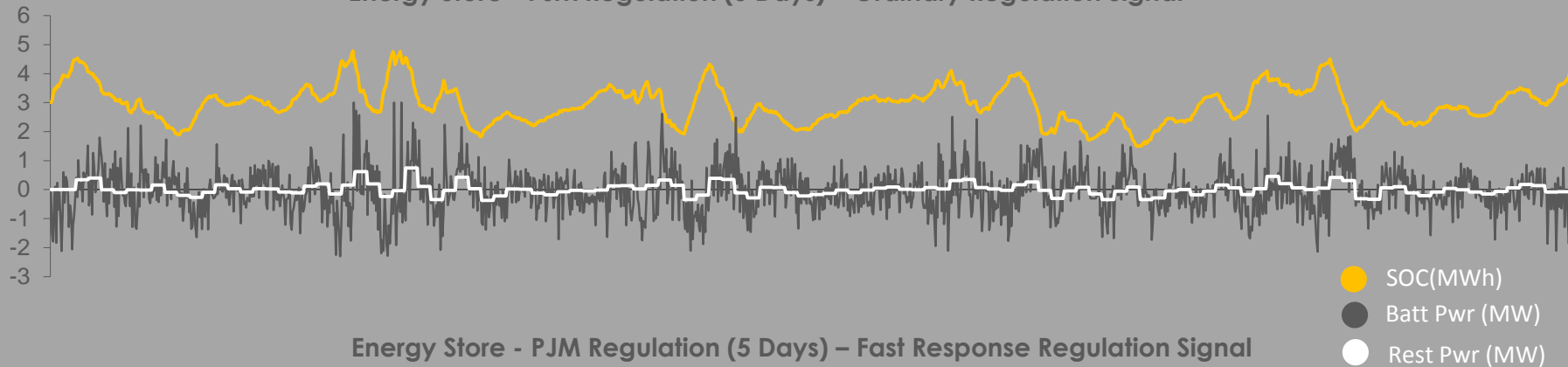
**Met-Ed**  
A FirstEnergy Company

# UltraBattery™

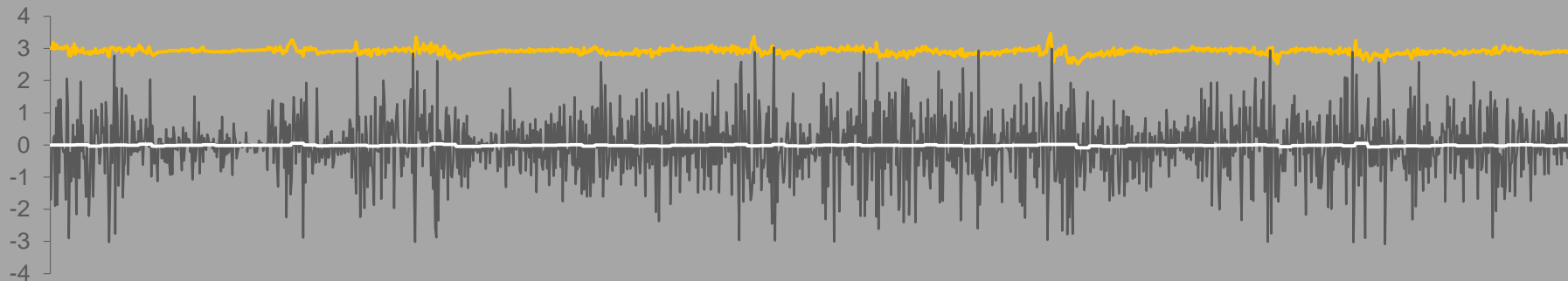
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Energy Store - PJM Regulation (5 Days) – Ordinary Regulation Signal



Energy Store - PJM Regulation (5 Days) – Fast Response Regulation Signal



# REGULATION

## USE IN PARTIAL STATE OF CHARGE

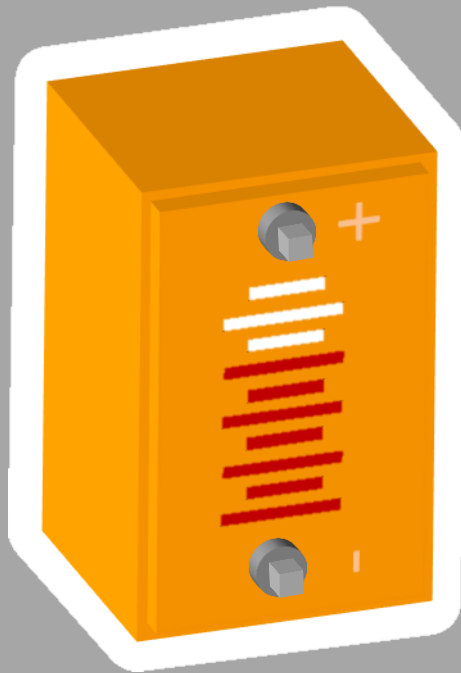
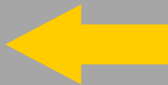
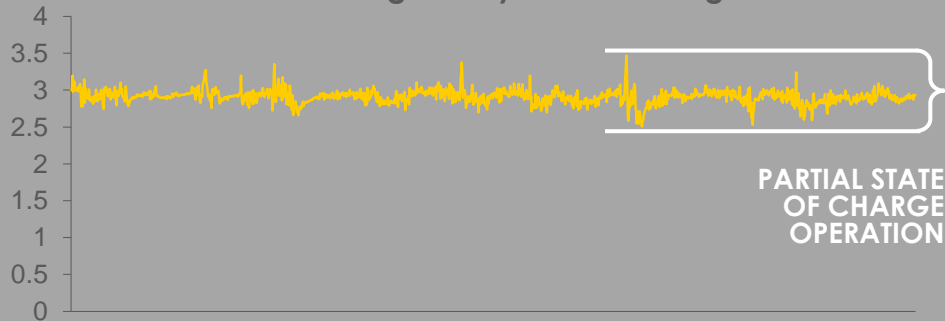
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Regulation Signal



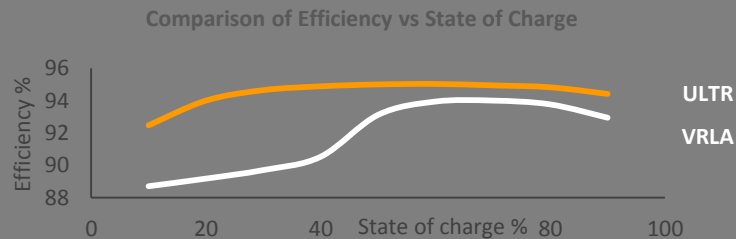
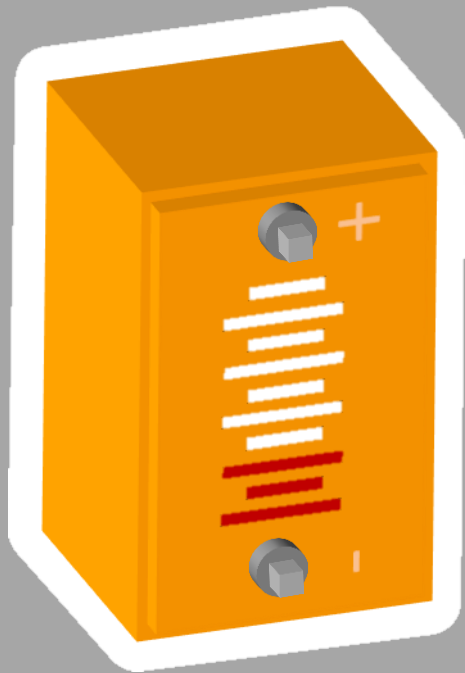
Resulting Battery State of Charge



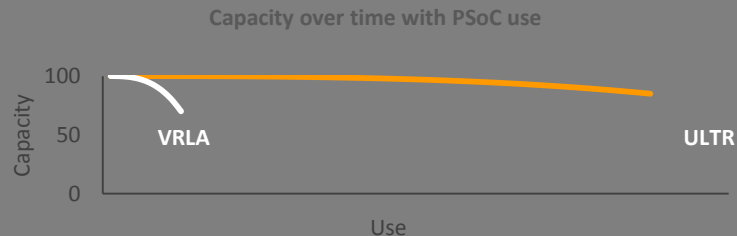
# LONG LIFE

& HIGH EFFICIENCY IN PARTIAL STATE OF CHARGE

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**UltraBattery is more efficient across range of SOC**

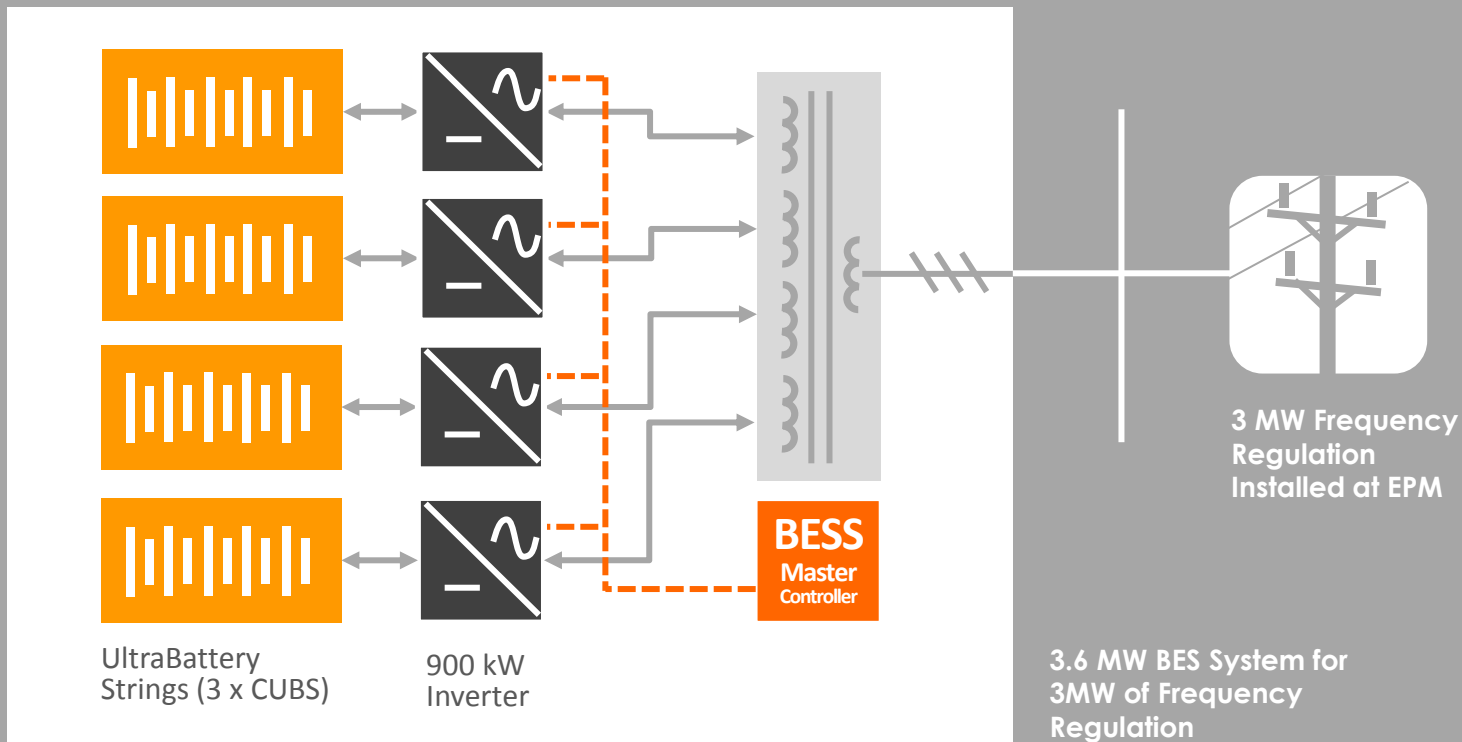


**UltraBattery can turn over much more energy during its life**

# BES (BATTERY ENERGY STORAGE) SYSTEM

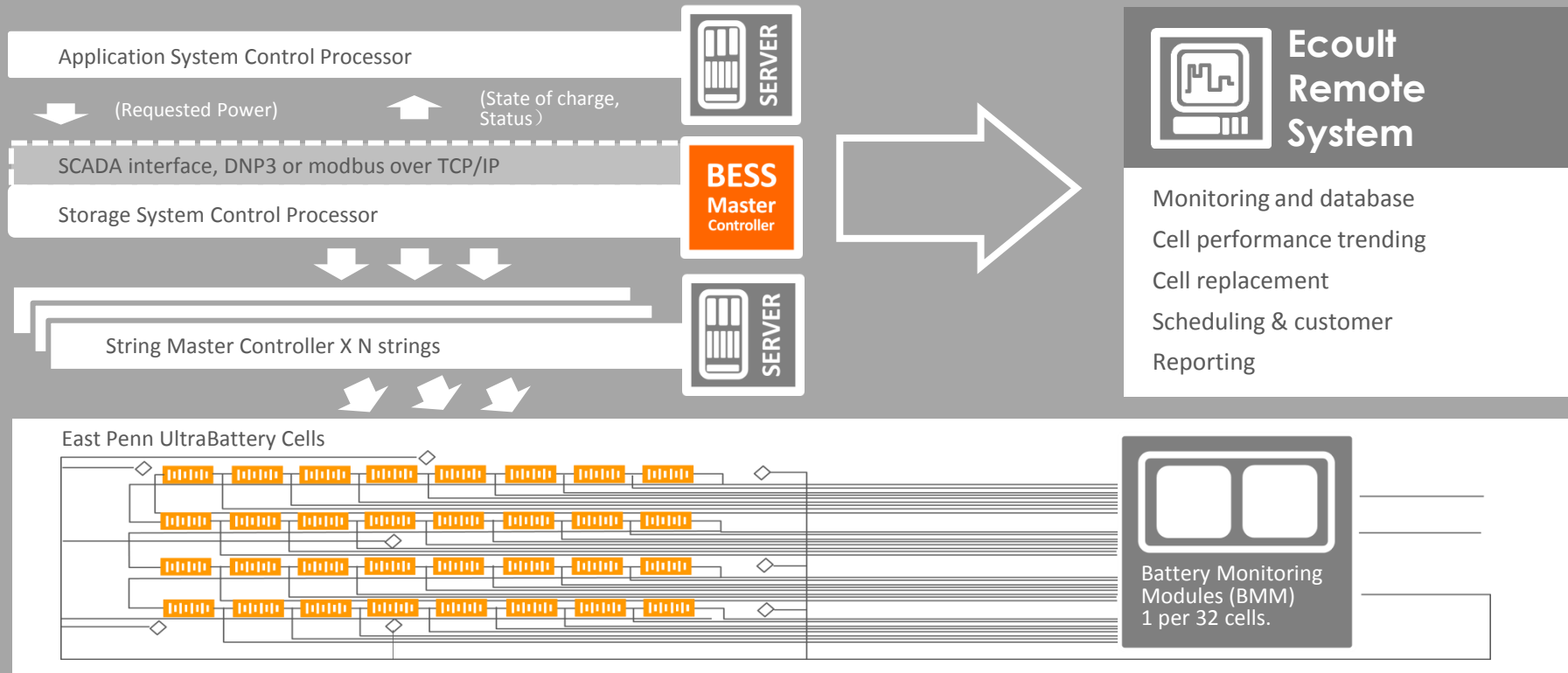
## EPM'S FREQUENCY REGULATION PROJECT

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# LOGIC STRUCTURE OF ENERGY STORAGE SYSTEM

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# ACCELERATED

CHARACTERIZATION

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ACCELERATED



# PROJECT STATUS

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UltraBattery

Management System

Power Control System

Buildings & Containers

System Integration

Interconnect

Commissioning and Operation

# UltraBattery™

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Status: **100%** complete

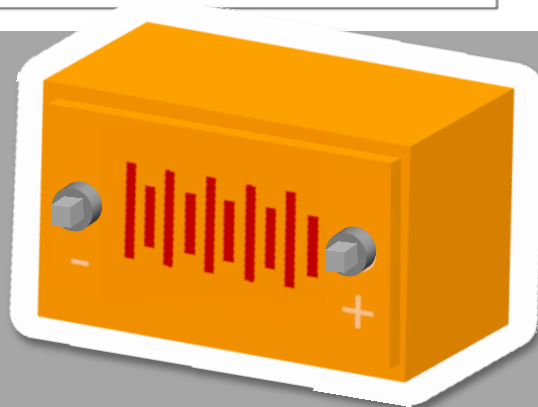
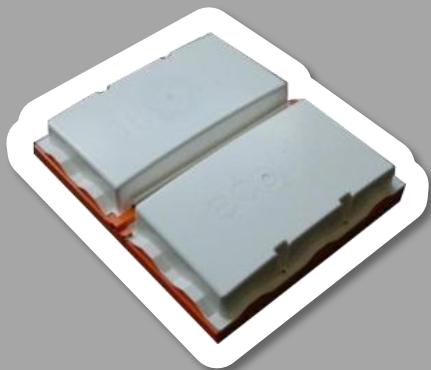
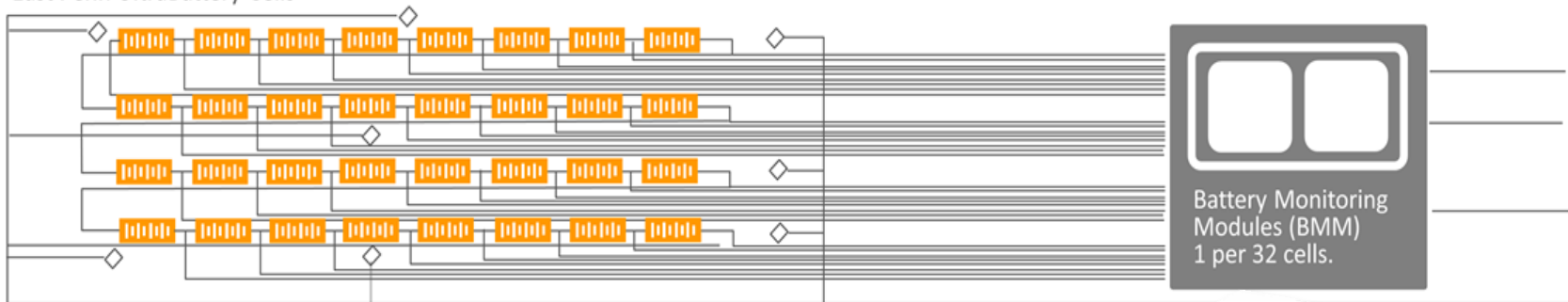
# BATTERY

## MANAGEMENT SYSTEM

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East Penn UltraBattery Cells



Status: **100%** complete

# POWER CONTROL SYSTEM

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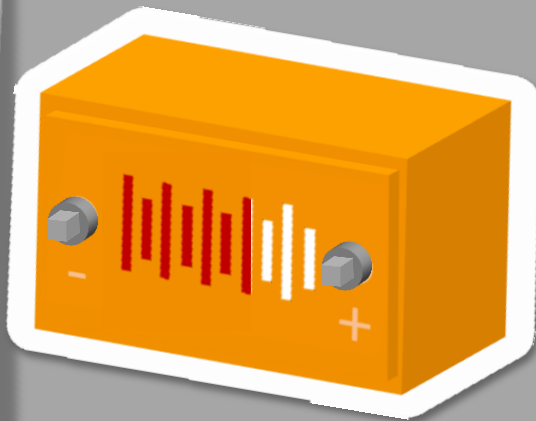
Main  
Enclosure



Control  
Panel



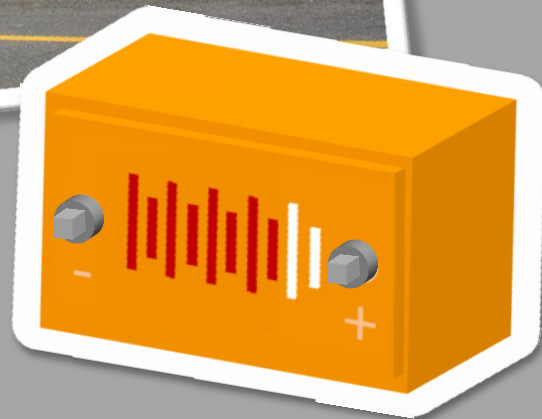
Power  
Modules



Status: **75%** complete

# BUILDING AND CONTAINERS

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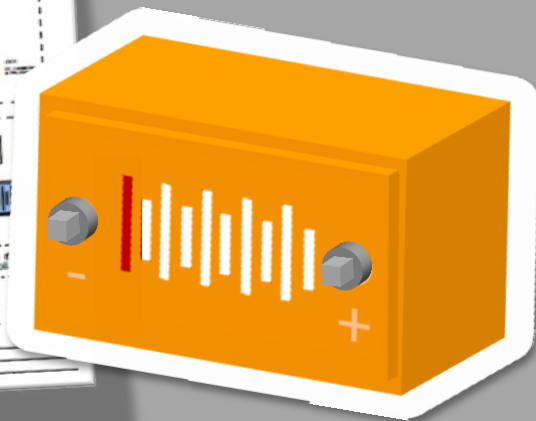
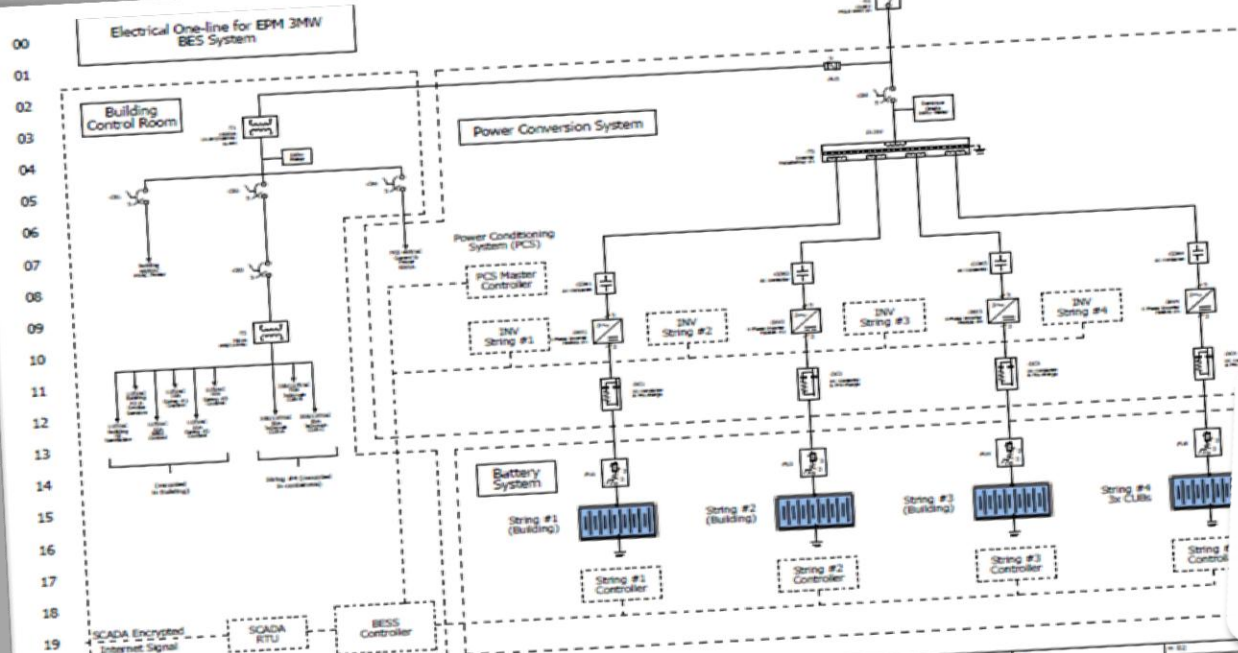


Status: **80%** complete



# SYSTEM INTEGRATION

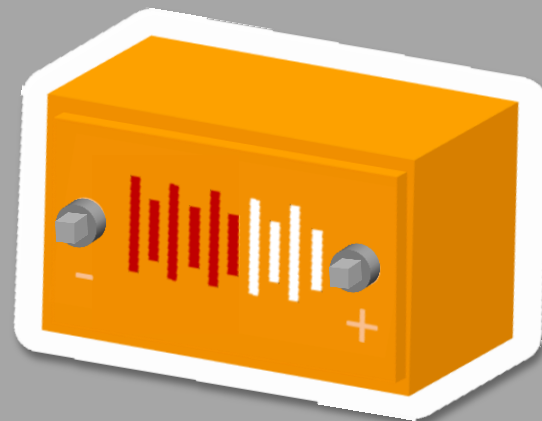
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Status: **15%** complete

# INTERCONNECT

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Status: **60%** complete

# COMMISSIONING AND OPERATIONS

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START OF OPERATIONS:  
**EARLY 2<sup>nd</sup>**  
**QTR 2012**

UltraBa

Manage

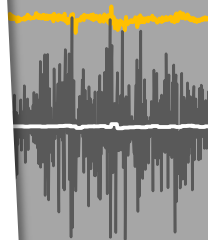
Power C

Building

System I

Intercon

(5 Days)





# THANK YOU

***EAST PENN manufacturing co., inc.***



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Project Leader

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